Imported malaria (1985–95): trends and perspectives

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Malaria is frequently imported into nonendemic industrialized areas. In this study we collated data on the reported malaria cases in industrialized countries during the period 1985–95, with the object of identifying trends and promising strategies. The main outcome measures were incidence, case-fatality rates (CFRs), and attack rates in tourists returning from Kenya.

Our survey showed gross underreporting and marked heterogeneity in the type and availability of national data. The total incidence or reported numbers of malaria infections in Europe increased from 6840 in 1985 to 7244 in 1995, with a peak of 8438 in 1989. The principal importing countries were France, Germany, Italy, and the United Kingdom. In the former USSR, the reported annual incidence dropped from 1145 in 1989 to 356 in 1990 after cessation of activities in Afghanistan. Among the imported species of malaria parasite, *Plasmodium falciparum* was identified in an increasing proportion, the CFR ranging from 0% to 3.6%, with consistently high rates in Germany. The attack rates among travellers to Kenya in 1990–95 were high, ranging from 18 to 207 per 100 000 travellers.

Our findings indicate that in industrialized countries malaria is associated with a high CFR and remains a public health problem. Irregular surveillance and lack of homogeneity in the collected data hinder the assessment of incidences, risk groups, and the efficacy of chemoprophylaxis.

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Introduction

The decline or "natural recession" of indigenous malaria in industrialized countries during the middle of the 19th century (*1*) has been attributed to several factors, such as drainage of swampy areas, better animal husbandry, improved housing, greater availability of quinine, and general socioeconomic improvement. Indeed, the achievement of malaria eradication on the continent of Europe is viewed as a major success in the chequered history of global malaria eradication (*2, 3*). Nevertheless, malaria continues to be imported into industrialized areas, which have been classified as "malaria free", as a result of human migration and the current tidal wave of tourist travel to malaria-endemic countries.

A brief glance at travel statistics shows the spectacular growth in tourism worldwide (*4*). For example, in Africa, the main global reservoir of malaria, there were 17 875 000 international tourist arrivals in 1993 compared with 750 000 in 1960, an average annual growth rate of 10.1% (*4*). The serum of travellers returning from sub-Saharan Africa showed a high prevalence of antibodies against the circumsporozoite antigen of *Plasmodium falciparum* (6–49%, depending on the type of travel), which indicates a high rate of malaria infection (*5*). However, only a small proportion of travellers to malaria-endemic areas will actually develop the clinical infection. This situation poses a double hazard: first, to the individuals who acquire malaria because the disease may remain undiagnosed or be incorrectly diagnosed, with resultant high case-fatality rates; and second, to the communities these individuals may come into contact with on their return to Europe, because active malaria vectors and favourable environmental conditions could result in local transmission of malaria. Thus, several outbreaks of autochthonous malaria transmission have recently been reported in "malaria-free" USA (*6–9*) and in Europe as a result of the introduction of infected mosquitos by aircraft (airport malaria) (*10*) or contamination of local European mosquitos that have fed on infected persons returning from endemic areas (*11–13*). Global warming is unlikely to lead to widespread transmission because the principal factor in the eradication of malaria from previously endemic areas was not vector eradication (the anopheles continuing to be present) but improved living standards, better housing and protection against mosquito entry.

Quantifying the risks to travellers is necessary before optimal recommendations can be developed. The object of our survey was therefore to monitor imported malaria cases over the period 1985–95 and to determine the reported incidence of the disease in industrialized countries, the case-fatality rates (CFRs), and the incidence among travellers to Kenya from selected countries.

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Materials and methods

In this retrospective survey, *imported malaria* describes an infection that was acquired in an endemic area by an individual (either a tourist or indigenous native) but was diagnosed in a nonendemic industrialized country after development of the clinical disease. Using addresses provided by WHO, we requested the persons responsible for malaria surveillance in each industrialized country concerned to send us a report on malaria surveillance data for the period 1985–95. Countries that did not respond were contacted again on two or more occasions by fax and phone. WHO was also asked to provide any data on malaria incidence that had been received from selected countries. In particular, the following key data were requested:

– the total number of malaria cases reported annually;
– the species involved and the total number of *P. falciparum* cases reported annually;
– the number of fatalities due to malaria infection reported yearly, from which the CFR was calculated for *P. falciparum* infections; and
– the total number of malaria infections imported annually from Kenya, when available. Kenya was chosen since the vast majority of travellers to the country are usually nonimmune tourists and denominator data are available from the World Tourism Organization (WTO).

These findings were collated and sent to each country for verification.

Results

A total of 23 of the 26 (88%) countries surveyed responded with data, 12 (46%) of them providing all the requested data. The methods of data collection varied between countries (Table 1), but most had a national notification form and notification was usually mandatory. For the post-1993 period, only incomplete data were available from the former Yugoslavia. Many national authorities considered that their data underestimated the true situation and that underreporting was rampant. The survey also showed marked heterogeneity in the quantity and quality of certain key data such as chemoprophylaxis used, traveller status, country of origin of infection, and information on recovery and deaths, which were infrequently collected despite the recommendations and proposals for standardized reporting made in 1988 at a meeting of European representatives responsible for malaria surveillance (*14*).

Total number of reported malaria cases

A total of 77 683 reported malaria cases were imported into Europe over the period 1985–95. The trend in recent years is towards stable or increasing case numbers (Table 2), the overall increase in the total of malaria cases reported between 1985 and 1995 being 5.9%. The range varies from 0 (Malta) to 2332 cases (United Kingdom, 1991); 17 countries reported 200 cases (or fewer) annually, 6 countries reported 200–1000 cases, and the United Kingdom reported >1000 cases annually. Outside Europe, only the USA reported slightly more than 1000 malaria cases annually. In the former USSR, case numbers dropped from 1145 in 1989 to 356 in 1990 after cessation of activities in Afghanistan.

Species profile of imported cases

The proportion of *Plasmodium* spp. varied considerably between the countries (Table 3). *P. falciparum* was the predominant species, accounting annually for more than 50% of all cases. France showed the highest proportion of *P. falciparum* cases, sometimes exceeding 80%, the lowest (approximately 40%) being recorded in the USA.

Case-fatality rate profile

Collection of information on deaths due to malaria was not consistent in the various European countries. German travellers appeared to have the highest CFR (mean for 1989–95, 3.6%) (Table 4) in the industrialized countries. Incomplete data from Portugal indicated a very high CFR in 1993 (11 deaths among 18 *P. falciparum* cases, CFR 61%), but this figure could not be confirmed. The United Kingdom, in contrast, showed consistently low CFRs, on average 0.7%.

Attack rates among travellers to Kenya

Travel statistics collated by WTO compared poorly in some cases with statistics collected by national bodies. The Swiss national statistics did not correlate with the WTO tourist statistics. Malaria attack rates in tourists from various European countries to Kenya were compared for the years 1990–95 (Table 5). The highest attack rate, 160 per 100 000, was observed among Italian travellers in 1993. German travellers appeared to be particularly at risk with consistently high attack rates (mean, 128 per 100 000). Low attack rates (mean, 61 per 100 000) were observed in US travellers.

Discussion

The 5.9% increase in imported malaria cases (Table 2) during the 11-year survey period is less than the proportional increase in travellers to malaria-endemic regions. Fluctuations in malaria in the endemic areas, changes in compliance with and efficacy of chemoprophylaxis, and artefacts in the reporting of surveillance data have also probably influenced the results in Table 2. The observed increased incidence excludes the former USSR. Between 1981 and 1989 a total of 7683 cases of malaria were imported into the USSR from Afghanistan, mainly by demobilized military personnel (*15*). Notifications in many countries show an increase in recent years, but it is

Table 1. **Type of data collected on imported malaria by 22 industrialized countries**

	Type of data			
	Mandatory notification	**Specific notification form**	**Reports from laboratories**	**Confirmation of parasite[a]**
Europe				
Austria	yes[b]	yes	no	P, S
Belgium	yes[c]	yes	yes	P
Denmark	yes	no	no	P
Finland[d]	yes	yes	yes	P
France	no[e]	yes	yes	P
Germany	yes	yes	yes	P
Greece	yes	yes	no[f]	P
Ireland[g]	yes	no	no	n/a
Italy	yes	yes	no	P
Luxembourg	yes[h]	yes	no	P
Malta	yes	yes	yes[i]	P
Netherlands[g]	yes	yes	yes	P
Norway	yes	yes	yes	P
Poland	yes	no	no[k]	P
Portugal[g]	yes	yes	no	P, S
Spain	yes	yes	yes	P, C
Sweden	yes	no	yes	P
Switzerland	yes	yes	yes	P
United Kingdom	yes	yes	yes	P
Elsewhere				
Australia	yes	yes	yes	P
New Zealand	yes	yes	no	P
USA	yes	yes	yes	P

[a] P: parasitology; S: serology; C: clinical; n/a: data not available.

[b] Since 1994 only.

[c] Only indigenous infection in the Flemish part of the country.

[d] Estimates a level of underreporting of 20%.

[e] Only indigenous infection; estimates a level of underreporting of 55%.

[f] Hospitals also notify.

[g] No detection of duplicates and recurrent cases.

[h] Majority of cases reported by one national clinic.

[i] Reporting is done by hospital and laboratory.

[j] Estimates a level of underreporting of 59%.

[k] Laboratories rarely send data.

Further information on malaria surveillance in EEC countries is given in reference 18.

clear that the official notifications often understate the true position (*16*). In France it is estimated that only about 32% of all cases are notified (*17*). The problem of inconsistent malaria surveillance in European countries was reported in 1988 (*14*), but little has changed since then. A recent publication by Legros & Danis has addressed this question in detail in European countries (*18*). Attack rates are also likely to be underestimates as they do not take into account the cases occurring abroad and underreporting in the home countries. Some limitations are inherent in our survey because, in several countries, reporting is passive, incomplete and biased; however, collection of surveillance data is important to allow monitoring of trends.

P. falciparum was the dominant pathogenic agent but the actual profile of imported species varied considerably between countries, primarily reflecting the geographical source of the infection. The United Kingdom traditionally imported a large proportion of *P. vivax* infections through the large number of immigrants from India and Pakistan (*19*). However, in 1988, *P. falciparum* became the dominant imported species, reflecting the increased transmission of *P. falciparum* in Asia, the changing patterns of traveller origin, and drug resistance. In the USA, *P. falciparum* accounted for less than 50% of all imported infections because many Americans visit Central America and Asia rather than tropical Africa. Only 0.4 million American and Canadian travellers visited Africa, compared with 17 million to Central America and 2.1 million to Asia (*20*) — both predominantly *P. vivax* transmission areas.

In Italy, imported cases showed a high prevalence of *P. falciparum* infections, mainly because of African immigrants who visited their country of origin and became ill with malaria after returning to Italy (*21, 22*). Data from the Italian Ministry of Health indicate that malaria from immigrant communities accounts for an increasing proportion of national figures — from 14% in 1986 to 40.4% in 1991 (*22*). Unlike tourists, returning immigrants who rarely take any chemoprophylaxis have a high risk of infection, but are less likely to die from malaria and tend to have significantly lower parasitaemic levels than those recorded in travellers. This suggests that despite a loss of immunity, the presence of some residual immunological memory has a role in reducing the severity of the disease (*22*). Retrospective analyses of the chemoprophylactic status of persons with malaria acquired abroad confirm that immigrants rarely use chemosuppressive drugs (*21*). Immigrant groups in all industrialized countries are unlikely to seek medical advice prior to travel and need to be especially targeted with advice and protective measures.

Despite medical advances, it has proved to be difficult to reduce the CFR below 1%. The striking difference in malaria CFR between countries can only be partially explained by inadequate surveillance. Delayed identification of malaria and incorrect treatment point to deficits in medical awareness and expertise in the management of this infection. For the period 1977–86 the average malaria CFR for Europe as a whole was 1.1% (*16*). Our survey showed considerable intercountry variation; Germany had a high CFR, which could in part be explained by good mortality reporting in association with poor case reporting or poor case detection and lack of awareness about malaria among general practitioners. According to Zastrow et al. (*23, 24*), fatalities occurred almost exclusively from infections acquired in Africa, mainly among short-stay German tourists to Kenya. Tourists aged >60 years were especially at risk. Studies have shown that short-stay tourists to Kenya were particularly at risk of infection (*24, 25*). Tourists who visit Kenya without malaria chemoprophylaxis develop malaria at a rate of 1.2% per

Table 2. **Number of imported cases of malaria in selected industrialized countries, 1985–95**

	No. of cases in											Annual mean number of cases	Total number of cases
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995		
Europe													
Austria	82	92	52	83	98	112	111	58	89	75	80	85	932
Belgium	208	298	258	271	272	264	314	249	320	423	304	289	3181
Czechoslovakia	9	11	20	26	28	7	8	7	8	n/a[a]	n/a	14	124
Denmark	128	178	138	142	125	114	110	110	113	136	175	134	1469
Finland	30	28	19	n/a[a]	52	46	33	39	31	49	31	36	358
France	631	1125	1143	1664	1863	1491	1165	905	769	824	1167	1159	12 747
Germany	591	1137	794	1030	1143	976	900	773	732	830	941	895	9847
Greece	34	39	47	52	48	28	45	29	35	27	24	37	408
Ireland	22	21	28	30	23	12	11	15	9	12	9	17	192
Italy	178	191	287	350	468	521	471	499	688	782	743	471	5178
Luxembourg	7	3	5	n/a	8	7	5	1	4	6	6	5	52
Malta	4	5	2	2	10	3	5	0	4	2	6	4	43
Netherlands	137	167	153	259	244	248	272	179	223	236	312	221	2430
Norway	53	68	47	53	52	60	71	36	76	73	80	61	669
Poland	15	14	16	21	22	21	16	17	27	18	20	19	207
Portugal	62	95	119	113	161	129	108	61	49	67	n/a	96	964
Romania	10	8	13	n/a	5	9	11	19	21	20	30	15	146
Spain	112	179	166	176	118	161	159	154	171	268	263	175	1927
Sweden	140	147	155	172	180	205	149	124	143	160	161	158	1736
Switzerland	200	196	192	322	340	295	322	261	285	310	289	274	3012
United Kingdom	2212	2309	1816	1674	1987	2096	2332	1629	1922	1887	2055	1993	21 919
Former USSR	1918	1686	1323	1580	1145	356	254	188	293	485	548	889	9776
Yugoslavia	57	75	64	53	46	23	18	10	20	n/a	n/a	41	366
Total	**6840**	**8072**	**6857**	**8073**	**8438**	**7184**	**6890**	**5363**	**6032**	**6690**	**7244**		**77 683**
Elsewhere													
Australia	421	696	574	601	770	874	939	743	670	710	610	692	7608
Canada	314	436	515	307	284	417	674	407	483	n/a	637	447	4474
Japan	53	50	40	48	49	49	52	49	51	64	n/a	51	505
New Zealand	n/a	n/a	n/a	n/a	27	32	39	29	58	34	41	37	260
USA	1045	1091	932	1023	1102	1098	1046	910	1275	1014	n/a	1054	10 536
Total	**1833**	**2273**	**2061**	**1979**	**2232**	**2470**	**2750**	**2138**	**2537**	**1822**	**1288**		**23 383**

[a] n/a: data not available.

month (*26, 27*). In the absence of international consensus on recommendations for malaria chemoprophylaxis to travellers to Kenya during the period 1990–95, it is possible that the different attack rates can to some extent be attributed to differences in the chemoprophylaxis used and/or compliance with medication and anti-mosquito measures. The prophylactic regimens of choice for travellers to Kenya were mefloquine (in Switzerland and the USA) or chloroquine plus proguanil (in Sweden and the United Kingdom). Table 5 shows that infection rates were somewhat lower in some countries where mefloquine was the first-choice regimen, but no generalization on the effectiveness of the various regimens can be made due to other factors. After mefloquine was recommended in the United Kingdom for travellers going to East Africa in 1993, the rate of imported cases from this area fell substantially (*28*). At the same time, the number of malaria patients who reported taking no chemoprophylaxis has remained constant. Taking malaria transmission levels into account, these observations have been interpreted as evidence for the superior protective efficacy of mefloquine. Similarly, the 38% decline among US civilians in the number of falciparum infections acquired in Africa during 1991–92 has been attributed in part to increased use of the more effective mefloquine regimen (*28*).

Information on compliance with malaria prophylaxis was only sporadically available in our survey but other reports stress its importance (*29, 30*). Approximately 81% of imported malaria infections among US civilians occurred in those who had not taken a chemoprophylactic regimen, as recommended by the US Centers for Disease Control and Prevention (*31*). Among malaria cases imported to Germany (1987–91), about 35% of infected individuals had not used any chemoprophylaxis (*24*). Pryce et al. found poor compliance among travellers to Kenya, with only 16% of cases using currently

Table 3. **Percentage of the total number of cases of malaria caused by *Plasmodium falciparum* in selected industrialized countries, 1989–95**

	% of cases							
	1989	1990	1991	1992	1993	1994	1995	Annual average
Austria	64.3	47.3	43.2	34.5	56.2	56.0	57.5	51.3
Belgium	68.0	74.2	68.5	65.1	55.9	n/a	n/a	66.3
France	81.1	78.0	n/a[a]	n/a	81.1	84.5	86.0	82.2
Germany	60.7	60.2	58.9	63.3	48.8	67.8	55.9	59.4
Greece	60.4	57.1	44.4	31.0	54.3	37.0	25.0	44.2
Italy	73.7	75.8	74.3	73.5	68.0	72.1	70.9	72.6
Netherlands	68.0	69.0	61.8	61.5	59.6	64.4	55.8	62.9
Portugal	82.6	79.1	79.6	55.7	36.7	n/a	n/a	66.8
Spain	59.3	54.0	64.2	55.8	51.5	71.6	60.5	59.6
Sweden	44.4	56.1	42.3	54.0	61.5	75.0	52.2	55.1
Switzerland	49.7	58.3	42.9	54.0	51.6	61.0	65.7	54.7
United Kingdom	56.2	52.3	56.3	57.4	54.5	62.4	54.1	56.2
USA	40.7	39.0	39.2	32.5	35.8	43.6	n/a	38.5
Annual mean	**62.2**	**61.6**	**56.3**	**53.2**	**55.1**	**63.2**	**58.4**	

[a] n/a: data not available.

advised regimens (*25*). Gyorkos et al. found that compliance with chemoprophylaxis was effective in reducing the malaria risk (*32*). Short-stay travellers often use no protection or inadequate regimens or are noncompliant with their medication. Deaths occur more often among individuals who did not use chemoprophylaxis, and prior chemoprophylaxis leads to a reduction in the severity of falciparum malaria (*33*). Appropriate, effective chemoprophylaxis should therefore be recommended for use by travellers to risk areas and the protective efficacy of individual prophylactic regimens needs constant monitoring. The popularity of "last-minute" travel bargains will increase the number of unprotected tourists travelling to malaria-endemic areas and lead to an increased incidence of malaria.

Inconsistent surveillance, lack of homogeneity in the collected data, and lack of monitoring of drug responses have been major obstacles to quantifying the problem of imported malaria in industrialized countries. Improvements in surveillance and reporting would therefore help to quantify incidences, identify risk groups, and provide an indication of the prophylactic efficacy of various regimens. A standardized form for international use in the gathering of data on malaria cases could be introduced. A priority for industrialized countries could be the creation of a

Table 4. **Case fatality rates (CFRs) among cases of *Plasmodium falciparum* malaria in selected industrialized countries, 1989–95**

	1989			1990			1991			1992		
	Cases	Fatalities	CFR %	Cases	Fatalities	CFR %	Cases	Fatalities	CFR %	Cases	Fatalities	CFR %
Austria	63	1	1.59	53	1	1.89	48	0	0.00	20	0	0.00
France	1511	18	1.19	1163	15	1.29	n/a[a]	20	–	n/a	11	–
Germany	694	22	3.17	588	19	3.23	530	10	1.89	489	21	4.29
Greece	29	0	0.00	16	0	0.00	20	0	0.00	9	0	0.00
Italy	345	7	2.03	395	7	1.77	350	6	1.71	367	7	1.91
Netherlands	166	2	1.20	171	1	0.58	168	2	1.19	110	2	1.82
Spain	70	0	0.00	87	0	0.00	102	2	1.96	86	4	4.65
Switzerland	169	2	1.18	172	3	1.74	138	3	2.17	141	2	1.42
United Kingdom	1117	4	0.36	1097	4	0.36	1314	12	0.91	935	11	1.18
USA	448	4	0.89	428	2	0.47	410	0	0.00	296	7	2.36

	1993			1994			1995			1989–95		
	Cases	Fatalities	CFR %	Cases	Fatalities	CFR %	Cases	Fatalities	CFR %	Cases	Fatalities	CFR %
Austria	50	2	4.00	42	0	0.00	46	1	2.17	322	5	1.55
France	624	10	1.60	696	12	1.72	1004	13	1.29	4998[b]	99	1.98
Germany	357	17	4.76	563	28	4.97	526	18	3.42	3747	135	3.60
Greece	19	0	0.00	10	0	0.00	6	0	0.00	109	0	0.00
Italy	468	4	0.85	564	4	0.71	527	5	0.95	3016	40	1.33
Netherlands	133	0	0.00	152	2	1.32	174	2	1.15	1074	11	1.02
Spain	88	1	1.14	192	3	1.56	159	5	3.14	784	15	1.91
Switzerland	147	3	2.04	189	2	1.06	190	2	1.05	1146	17	1.48
United Kingdom	1048	5	0.48	1178	11	0.93	1112	4	0.36	7801	51	0.65
USA	457	8	1.75	442	4	0.90	n/a	n/a	–	2481[b]	25	1.01

[a] n/a: data not available.

[b] Incomplete data: USA, 6 years; France, 5 years.

Table 5. **Malaria attack rates in travellers to Kenya, 1990–95**

	1990			1991			1992			1993			1994			1995			1990–1995
	No. of travellers	Cases	Rate per 10^5	No. of travellers	Cases	Rate per 10^5	No. of travellers	Cases	Rate per 10^5	No. of travellers	Cases	Rate per 10^5	No. of travellers	Cases	Rate per 10^5	No. of travellers	Cases	Rate per 10^5	Average rate per 10^5
Austria	15 100	20	132	15 350	8	52	14 041	6	43	16 607	9	54	9 650	12	124	13 880	9	65	78
Germany	123 000	188	153	12 640	140	110	109 973	167	152	130 000	105	81	132 300	197	149	108 707	136	125	128
Italy	41 400	63	152	40 130	33	82	35 105	22	63	42 000	67	160	55 000	80	145	34 701	72	207	135
Netherlands	n/a[a]	20	–	15 720	23	146	12 628	12	95	14 936	7	47	n/a	7	–	12 482	4	32	80
Sweden	n/a	15	–	n/a	5	–	22 739	4	18	27 000	7	26	30 000[b]	27	90	24 476	16	65	50
Switzerland	35 300	25	71	29 630	19	64	26 883	35	130	32 000	31	97	30 200	46	152	26 574	36	135	108
United Kingdom	105 100	128	122	141 420	176	124	117 458	129	110	139 000	92	66	129 000	87	67	116 106	80	69	93
USA	65 200	44	67	54 680	36	66	46 218	27	58	55 000	34	62	59 700	32	54	45 687	n/a	—	61

[a] n/a: data not available.

[b] Approximate figure.

one-page short form with key data variables, including demographic information (age, sex, name, nationality, occupation), reason for travel, area of acquisition of infection, chemoprophylaxis used, date of diagnosis, species identification, and outcome.

In conclusion, the almost 10 000 imported malaria cases reported annually illustrate the need to make tourists and immigrant groups more aware of the risk of malaria. Cooperation with the travel industry should lead to the development of preventive strategies to increase malaria awareness of travellers. In addition, the medical profession must be conditioned to consider malaria in the differential diagnosis of any unexplained fever and to act appropriately. ■

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Résumé

Le paludisme importé (1985-1995) : tendances et perspectives

Le paludisme est souvent importé dans des zones industrialisées où il n'existe normalement pas à l'état endémique. L'article donne les résultats d'une enquête qui a consisté à rassembler les données relatives aux cas de paludisme signalés dans les pays industrialisés au cours de la période 1985-1995, le but étant de dégager des tendances et de voir quelles stratégies sont prometteuses dans ce domaine. Les principales variables mesurées que nous avons examinées sont l'incidence, le taux de létalité et le taux d'atteinte chez des touristes au retour du Kenya.

Notre enquête a révélé une forte sous-notification et une hétérogénéité dans la nature et la disponibilité des données nationales sur le paludisme. L'incidence totale ou le nombre total de cas nouveaux de paludisme signalés en Europe est passé de 6840 en 1985 à 7244 en 1995, avec un maximum de 8438 en 1989. Les principaux pays ayant importé des cas sont l'Allemagne, la France, l'Italie et le Royaume-Uni. Dans l'ex-URSS, l'incidence notifiée est tombée de 1145 en 1989 à 356 en 1990, après cessation de l'intervention en Afghanistan. Parmi les espèces plasmodiales importées, la proportion de *Plasmodium falciparum* a augmenté, avec un taux de létalité allant de 0 à 3,6% et des valeurs toujours élevées en Allemagne. Chez les voyageurs qui s'étaient rendus au Kenya en 1990-1995, on a noté des taux d'atteinte élevés, qui allaient de 18 à 207 pour 100 000.

Nos observations montrent que dans les pays industrialisés, le paludisme entraîne un taux de létalité élevé et constitue un problème de santé publique. Une surveillance irrégulière et le manque d'homogénéité dans les données recueillies font obstacle à l'évaluation de l'incidence, au recensement des groupes à risque et à l'efficacité de la chimioprophylaxie.

Resumen

Paludismo importado (1985-1995): tendencias y perspectivas

El paludismo se exporta con frecuencia a zonas industrializadas no endémicas. Se informa aquí sobre los resultados de una encuesta acerca de los casos de paludismo notificados en los países industrializados

durante el periodo 1985-1995; el objetivo era detectar tendencias y estrategias prometedoras. Las principales medidas de resultados analizadas fueron la incidencia, las tasas de letalidad y las tasas de ataque entre turistas que habían visitado Kenya.

Nuestra encuesta reveló una importante subnotificación y una notable heterogeneidad en el tipo y disponibilidad de datos nacionales sobre el paludismo. La incidencia total o las cifras notificadas de casos de paludismo en Europa aumentaron de 6840 en 1985 a 7244 en 1995, con un máximo de 8438 en 1989. Los principales países importadores fueron Francia, Alemania, Italia y el Reino Unido. En la antigua URSS, la incidencia notificada disminuyó de 1145 en 1989 a 356 en 1990, tras el cese de las actividades en el Afganistán. Entre las especies de parásito del paludismo importadas, la mayor proporción correspondió a *Plasmodium falciparum*; las tasas de letalidad se situaron entre 0% y 3,6%, con valores sistemáticamente altos en Alemania. Las tasas de ataque entre los viajeros procedentes de Kenya en 1990-1995 fueron altas, entre 18 y 207 por 100 000 viajeros.

Nuestros resultados indican que los casos de paludismo que llegan a los países industrializados se asocian a tasas elevadas de letalidad y siguen representando un problema de salud pública. La irregular vigilancia y la heterogeneidad de los datos recopilados dificultan la evaluación de la incidencia, los grupos de riesgo y la eficacia de la quimioprofilaxis.

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